

WHAT IS CLAIMED IS:

1. An expandable wellbore junction system, comprising:

5 a wellbore junction assembly including:

an expandable wellbore junction having multiple intersecting
tubular legs; and

an orienting latch profile attached to the wellbore junction.

10 2. The system according to Claim 1, further comprising a drifting
apparatus positioned at least partially in the junction assembly, the drifting
apparatus being radially oriented relative to the wellbore junction by engagement
with the orienting latch profile.

15 3. The system according to Claim 2, wherein the drifting apparatus
includes a drift which is displaced in at least one of the tubular legs of the
wellbore junction, thereby reforming an interior geometry of the at least one of
the tubular legs.

20 4. The system according to Claim 3, further comprising a deflection
device releasably installed in the wellbore junction.

5. The system according to Claim 4, wherein the deflection device is radially oriented relative to the wellbore junction by engagement of the drifting apparatus with the orienting latch profile.

5 6. The system according to Claim 4, wherein deflection device deflects the drift to displace toward the at least one of the wellbore junction tubular legs.

7. The system according to Claim 1, further comprising a drifting apparatus which includes a drift, a gripping structure and an axial extension
10 device, the gripping structure anchoring the drifting apparatus to the wellbore junction assembly, and the extension device displacing the drift in at least one of the wellbore junction tubular legs.

8. The system according to Claim 7, wherein the gripping structure is
15 outwardly extended into gripping engagement with the wellbore junction assembly by a first predetermined pressure applied to the drifting apparatus.

9. The system according to Claim 8, wherein the extension device displaces the drift in response to a second predetermined pressure applied to the
20 drifting apparatus.

10. The system according to Claim 9, wherein the second pressure is greater than the first pressure.

11. The system according to Claim 9, further comprising a deflection
5 device releasably attached to the drifting apparatus, the deflection device being released for displacement of the drifting apparatus relative to the deflection device by application of a third predetermined pressure to the drifting apparatus.

12. The system according to Claim 11, wherein the third pressure is less
10 than each of the first and second pressures.

13. The system according to Claim 1, wherein the wellbore junction assembly further includes a cementing device attached to the wellbore junction, the cementing device being configured to direct cement flow outwardly from the
15 wellbore junction assembly.

14. The system according to Claim 13, wherein the cementing device includes a valve selectively permitting and preventing cement flow through the cementing device.

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15. The system according to Claim 13, further comprising a tubular string disposed in the wellbore junction assembly, cement flowing through the tubular string to the cementing device.

5 16. The system according to Claim 15, wherein the tubular string is sealingly engaged with the cementing device.

17. The system according to Claim 1, further comprising a whipstock engaged with the orienting latch profile, thereby radially orienting the whipstock relative to the wellbore junction, and a cutting device deflected off of the whipstock so that the cutting device forms a wellbore extending outwardly from one of the wellbore junction tubular legs.

18. The system according to Claim 1, wherein the wellbore junction assembly is attached to a tubular string in a first wellbore and extends outwardly from the tubular string into an enlarged cavity formed in the first wellbore.

19. The system according to Claim 18, wherein the wellbore junction is expanded outward within the cavity due to pressure applied within the wellbore junction, the wellbore junction is cemented within the cavity, and at least first and second wellbores are formed through the wellbore junction tubular legs and through cement surrounding the wellbore junction in the cavity.

20. A method of forming a sealed wellbore intersection in a subterranean well, the method comprising the steps of:

drilling a first wellbore;

under-reaming the first wellbore, thereby forming a radially enlarged

5 cavity;

positioning an expandable wellbore junction within the cavity;

expanding the wellbore junction within the cavity;

forcing a drift through at least one of multiple tubular legs of the wellbore junction;

10 cementing the wellbore junction within the cavity;

drilling a second wellbore through a first one of the tubular legs of the wellbore junction; and

drilling a third wellbore through a second one of the tubular legs of the wellbore junction.

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21. The method according to Claim 20, further comprising the step of installing a tubular string in the first wellbore after the first wellbore drilling step, and wherein the expandable wellbore junction positioning step further comprises attaching the wellbore junction to the tubular string.

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22. The method according to Claim 21, wherein the attaching step further comprises securing the wellbore junction so that in the expanding step

the second tubular leg is directed toward a desired orientation for drilling the third wellbore.

23. The method according to Claim 20, wherein the positioning step
5 further comprises installing the wellbore junction within the cavity as part of a junction assembly including an orienting latch profile.

24. The method according to Claim 23, wherein in the installing step,
the orienting latch profile is positioned between the wellbore junction and the
10 tubular string.

25. The method according to Claim 23, wherein in the installing step,
the wellbore junction is positioned between the orienting latch profile and the
tubular string.

15 26. The method according to Claim 23, wherein the drift forcing step further comprises positioning a drifting apparatus within the junction assembly, and engaging the drifting apparatus with the orienting latch profile, thereby securing the drifting apparatus within the junction assembly and radially
20 orienting the drifting apparatus relative to the junction assembly.

27. The method according to Claim 26, wherein the drifting apparatus engaging step further comprises radially orienting a deflection device relative to the junction assembly, so that the drift is directed to extend toward the second tubular leg of the wellbore junction.

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28. The method according to Claim 23, wherein the second wellbore drilling step further comprises engaging a whipstock with the orienting latch profile, thereby radially orienting the whipstock relative to the wellbore junction.

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29. The method according to Claim 20, wherein the positioning step further comprises installing the wellbore junction within the cavity as part of a junction assembly including a cementing device for flowing cement outward into the cavity.

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30. The method according to Claim 29, wherein in the positioning step the cementing device is attached to the first tubular leg outwardly disposed relative to an intersection between the first and second tubular legs.

31. The method according to Claim 29, wherein the cementing step
20 further comprises positioning a tubular string within the junction assembly, connecting the tubular string to the cementing device, and flowing cement through the tubular string and outward through the cementing device.

32. The method according to Claim 31, wherein the connecting step further comprises sealingly engaging the tubular string with the junction assembly.

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33. The method according to Claim 29, wherein the cementing step further comprises opening a valve within the cementing device to thereby permit cement flow through the cementing device.

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34. The method according to Claim 33, wherein in the expanding step the cementing device valve is closed, thereby permitting creation of a pressure differential between an interior and exterior of the junction assembly.

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35. The method according to Claim 20, wherein the drift forcing step further comprises installing a drifting apparatus in the wellbore junction.

36. The method according to Claim 35, wherein the drift forcing step further comprises applying pressure to the drifting apparatus to thereby force the drift to displace within at least one of the tubular legs of the wellbore junction.

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37. The method according to Claim 36, wherein the applying pressure step further comprises displacing a piston, thereby causing displacement of the drift.

5 38. The method according to Claim 36, wherein the applying pressure step further comprises outwardly extending a gripping structure, thereby anchoring the drifting apparatus relative to the wellbore junction.

10 39. The method according to Claim 35, wherein the installing step further comprises engaging the drifting apparatus with an orienting latch profile attached to the wellbore junction, thereby radially orienting the drifting apparatus relative to the wellbore junction.

15 40. The method according to Claim 39, wherein the installing step further comprises installing a deflection device in the wellbore junction, and wherein the radially orienting step further comprises radially orienting the deflection device relative to the wellbore junction.

20 41. The method according to Claim 35, wherein the installing step further comprises installing a deflection device in the wellbore junction, and wherein the drift forcing step further comprises deflecting the drift off of the deflection device.

42. The method according to Claim 41, wherein the installing step further comprises installing the drifting apparatus and deflection device in the wellbore junction in a single trip into the well.

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43. The method according to Claim 41, wherein the installing step further comprises conveying the deflection device into the wellbore junction attached to the drifting apparatus.

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44. The method according to Claim 43, wherein the installing step further comprises engaging an orienting profile, thereby radially orienting both the drifting apparatus and the deflection device relative to the wellbore junction.

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45. The method according to Claim 44, wherein the installing step further comprises securing the deflection device relative to the wellbore junction, and then anchoring the drifting apparatus relative to the wellbore junction.

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46. The method according to Claim 45, wherein the installing step further comprises detaching the deflection device from the drifting apparatus after the deflection device securing step and prior to the drifting apparatus anchoring step.

47. The method according to Claim 46, wherein the detaching step is performed by applying pressure to the drifting apparatus.

48. The method according to Claim 45, wherein the anchoring step is
5 performed by outwardly extending a gripping structure from the drifting apparatus.

49. The method according to Claim 20 further comprising the step of
retrieving a deflection device from within the wellbore junction by engaging an
10 enlarged shoulder attached to the drift with a shoulder attached to the deflection device.

50. A drifting apparatus for use in a wellbore junction installed in a subterranean well, the apparatus comprising:

a drift;

a displacement device displacing the drift in the wellbore junction; and

5 a securing device securing the apparatus relative to the wellbore junction.

51. The apparatus according to Claim 50, wherein the displacement device displaces the drift in response to pressure applied to the displacement device.

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52. The apparatus according to Claim 51, wherein the displacement device displaces the drift in response to pressure applied to a tubular string connected to the drifting apparatus.

15 53. The apparatus according to Claim 51, wherein the displacement device includes a piston exposed to pressure applied to the displacement device, the piston being attached to the drift, and the piston displacing the drift when a predetermined pressure is applied to the displacement device.

20 54. The apparatus according to Claim 50, wherein the securing device includes an outwardly extendable gripping structure.

55. The apparatus according to Claim 54, wherein the gripping structure includes at least one slip.

56. The apparatus according to Claim 54, wherein the gripping
5 structure outwardly extends from the drifting apparatus when a predetermined pressure is applied to the apparatus.

57. The apparatus according to Claim 50, wherein the securing device includes a latch which engages a latch profile attached to the wellbore junction.

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58. The apparatus according to Claim 57, wherein the latch is an orienting latch and the latch profile is an orienting latch profile, whereby the drifting apparatus is radially oriented relative to the wellbore junction when the latch engages the latch profile.

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59. The apparatus according to Claim 58, further comprising a deflection device for deflecting the drift relative to the wellbore junction, the deflection device being radially oriented relative to the wellbore junction when the latch is engaged with the latch profile.

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60. The apparatus according to Claim 50, further comprising a deflection device releasably attached to the displacement device, the deflection

device laterally deflecting the drift when the displacement device displaces the drift in the wellbore junction.

61. The apparatus according to Claim 60, wherein the deflection device
5 is released, permitting relative displacement between the displacement device and the deflection device, when a predetermined pressure is applied to the drifting apparatus.

62. The apparatus according to Claim 60, further comprising an
10 enlarged shoulder attached to the drift, and a no-go shoulder attached to the deflection device, engagement between the enlarged shoulder and the no-go shoulder permitting retrieval of the deflection device with the displacement device after the deflection device is released for displacement relative to the displacement device.

63. A deflection device assembly for use in an expandable wellbore junction, the assembly comprising:

a deflection device including:

a laterally inclined deflection surface;

5 a generally tubular neck; and

a substantially flexible intermediate section connected between the neck and the deflection surface, the intermediate section flexing when the deflection device is installed in the wellbore junction, thereby permitting relative angular deflection between the deflection surface and the neck.

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64. The assembly according to Claim 63, further comprising a wellbore junction drifting apparatus disposed at least partially in the deflection device neck.

15 65. The assembly according to Claim 63, further comprising a latching device attached to the deflection device.

66. The assembly according to Claim 63, further comprising an upwardly facing muleshoe attached to the deflection device.

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67. The assembly according to Claim 63, further comprising a pressure actuated releasing device attached to the deflection device.

68. The assembly according to Claim 63, further comprising an orienting latch attached to the deflection device, the orienting latch radially orienting the deflection surface relative to the wellbore junction.

69. A method of drifting an expandable wellbore junction in a subterranean well, the method comprising the steps of:

conveying a drifting apparatus into the wellbore junction; and

displacing a drift of the drifting apparatus in at least one of multiple

5 intersecting tubular legs of the wellbore junction.

70. The method according to Claim 69, wherein the conveying step further comprises conveying a deflection device into the wellbore junction, the deflection device being configured to deflect the drift to enter a selected one of

10 the wellbore junction tubular legs.

71. The method according to Claim 70, wherein in the conveying step the drifting apparatus and deflection device are conveyed into the wellbore junction in a single trip into the well.

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72. The method according to Claim 71, further comprising the step of retrieving the drifting apparatus and deflection device from the well.

73. The method according to Claim 72, wherein the conveying and
20 retrieving steps are performed in the single trip into the well.

74. The method according to Claim 70, further comprising the step of radially orienting the deflection device relative to the wellbore junction.

75. The method according to Claim 74, wherein the radially orienting
5 step further comprises engaging an orienting profile attached to the wellbore junction.

76. The method according to Claim 75, wherein the engaging step further comprises engaging a latch of the drifting apparatus with the orienting
10 profile.

77. The method according to Claim 74, wherein the radially orienting step further comprises simultaneously radially orienting both the drifting apparatus and the deflection device relative to the wellbore junction.

15 78. The method according to Claim 77, further comprising the step of securing the deflection device relative to the wellbore junction after the radially orienting step.

20 79. The method according to Claim 78, wherein the securing step further comprises engaging an engagement device attached to the deflection device with an engagement profile attached to the wellbore junction.

80. The method according to Claim 78, further comprising the step of releasing the drifting apparatus for displacement relative to the deflection device after the securing step.

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81. The method according to Claim 80, wherein the releasing step is performed by applying a first predetermined pressure to the drifting apparatus.

82. The method according to Claim 80, further comprising the step of
10 anchoring the drifting apparatus relative to the wellbore junction after the releasing step.

83. The method according to Claim 82, wherein the anchoring step is performed by applying a second predetermined pressure to the drifting
15 apparatus.

84. The method according to Claim 82, wherein the anchoring step further comprises outwardly extending a gripping structure from the drifting apparatus.

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85. The method according to Claim 82, further comprising the steps of displacing the drift, and deflecting the drift off of the deflection device.

86. The method according to Claim 85, wherein the displacing step is performed by applying a third predetermined pressure to the drifting apparatus.

5 87. The method according to Claim 85, wherein the displacing and deflecting steps are performed after the anchoring step.

88. The method according to Claim 69, wherein in the conveying step the drifting apparatus includes a tubular string having a knuckle joint
10 interconnected therein, and further comprising the step of actuating the knuckle joint to direct the drift toward the at least one of the wellbore junction tubular legs.

89. The method according to Claim 88, wherein the actuating step is
15 performed after the conveying step and before the displacing step.

90. The method according to Claim 88, wherein the actuating step is performed by applying pressure to the tubular string.